

**WHAT IS CLAIMED IS:**

1. An optoelectronic device, comprising:

an optical substrate coupled to a submount and including an optical device; and

a signal and a ground conductor coupled to said submount, wherein said signal and ground conductors have a direction of signal propagation associated therewith, and wherein related transitions of said signal and ground conductors between said submount and said optical substrate are separated along said direction by a predetermined distance.

2. The optoelectronic device as recited in Claim 1 wherein said related transitions are transitions of said signal and ground conductors from said submount to said optical substrate.

3. The optoelectronic device as recited in Claim 1 wherein said predetermined distance is between about 10% and about 100% of a radian of phase of a shortest wavelength ( $WL_{min}$ ) of a signal that propagates along said signal and ground conductors.

4. The optoelectronic device as recited in Claim 1 wherein said optical device includes an optical waveguide having a

modulation region, and wherein one of said transitions is adjacent  
said modulation region.

5. The optoelectronic device as recited in Claim 1 wherein  
said related transitions are first transitions, and further  
including second related transitions of said signal and ground  
conductors between said submount and said optical substrate,  
wherein said second transitions are separated along said direction.

6. The optoelectronic device as recited in Claim 1 wherein  
said optical device is a modulator.

7. The optoelectronic device as recited in Claim 1 further  
including a coplanar waveguide and a load resistor, said coplanar  
waveguide located on said submount and including a signal trace and  
a ground trace respectively contacting said signal and ground  
conductors, said load resistor coupled to said signal conductor at  
an end opposite from said signal trace, wherein a distance ( $d_1 + d_2$ )  
between said signal trace and said load resistor is less than  
or equal to the shortest wavelength ( $WL_{min}$ ) that propagates along  
said signal and ground conductors.

8. The optoelectronic device as recited in Claim 1 wherein  
2 said predetermined distance defines a region that is at least a  
3 portion of an inductive element.

9. The optoelectronic device as recited in Claim 1 wherein  
2 said submount and said optical substrate are separated by a gap  
3 ranging between about 1  $\mu\text{m}$  and about 30  $\mu\text{m}$ , wherein a material  
4 having a dielectric constant less than about 4.0 occupies said gap.

10. The optoelectronic device as recited in Claim 1 wherein  
2 said optoelectronic device is included within an optical  
3 communications system including a transmitter or a receiver.

11. A transmission line, comprising:

2 a modulating device located on an optical substrate and  
3 including a plurality of interconnecting transmission line segments  
4 located on or in said optical substrate and each having an inherent  
5 inductance that provide a predetermined characteristic impedance of  
6 said transmission line when combined with a capacitance of said  
7 modulating device.

12. The transmission line as recited in Claim 11 wherein said  
2 modulating device is an electro-absorption modulator.

13. The transmission line as recited in Claim 11 wherein said  
2 transmission line segments include signal and ground conductors  
3 having a direction of signal propagation associated therewith, each  
4 of said signal and ground conductors having related transitions  
5 between said optical substrate and said modulating device, said  
6 related transitions being separated along said direction by a  
7 predetermined distance.

14. The transmission line as recited in Claim 13 wherein said  
2 predetermined distance is between about 10% and about 100% of a  
3 radian of phase of a shortest wavelength ( $WL_{min}$ ) of a signal that  
4 propagates along said transmission line.

15. The transmission line as recited in Claim 13 wherein said  
2 modulating device includes an optical waveguide having a modulation  
3 region, and wherein one of said transitions is adjacent said  
4 modulation region.

16. The transmission line as recited in Claim 13 wherein said  
2 predetermined distance defines a region that is at least a portion  
3 of an inductive element.

17. The transmission line as recited in Claim 11 wherein said  
2 transmission line is included within an optical communications  
3 system including a transmitter or a receiver.

18. An optical communications system, comprising:

2 a transmission line including a modulating device having an  
3 optical waveguide and located on an optical substrate, said  
4 modulating device including a plurality of interconnecting  
5 transmission line segments located on or in said optical substrate  
6 and each having an inherent inductance that provides a  
7 predetermined characteristic impedance of said transmission line  
8 when combined with a capacitance of said modulating device; and  
9 a laser optically coupled to said optical waveguide.

19. The optical communications system recited in Claim 18  
2 wherein said transmission line segments include signal and ground  
3 conductors having a direction of signal propagation associated  
4 therewith, each of said signal and ground conductors having related  
5 transitions between said optical substrate and said modulating  
6 device, said related transitions being separated along said  
7 direction by a predetermined distance.

20. The optical communications system recited in Claim 19  
2 wherein optical waveguide includes a modulation region, and wherein  
3 one of said transitions is adjacent said modulation region.